Volunteer Lake Assessment Program Individual Lake Reports

SUNRISE LAKE, MIDDLETON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,112	**Max. Depth (m):**	4.1	**Flushing Rate (yr^{1}):**	2
Surface Area (Ac.):	257	**Mean Depth (m):**	1.9	**P Retention Coef:**	0.71
Shore Length (m):	5,500	**Volume (m^{3}):**	1,966,000	**Elevation (ft):**	666

TROPHIC CLASSIFICATION

Year	Trophic class
1977	OLIGOTROPHIC
1990	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2018 305(b) report on the status of N.H. waters, and are based on data collected from 2008-2017. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm

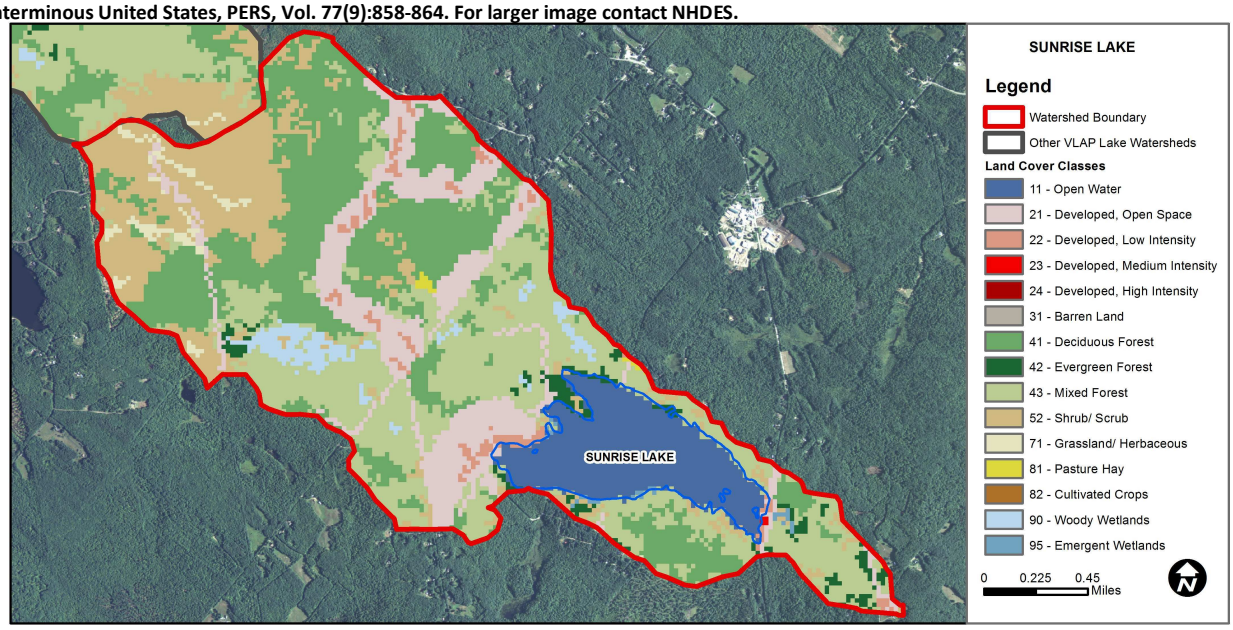
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Dissolved oxygen satura	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Chlorophyll-a	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
Primary Contact Recreation	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

SUNRISE LAKE - TOWN BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	10.2	Barren Land	0	Grassland/Herbaceous	1.14
Developed-Open Space	13.2	Deciduous Forest	27.25	Pasture Hay	0.2
Developed-Low Intensity	1.75	Evergreen Forest	2.04	Cultivated Crops	0
Developed-Medium Intensity	0.04	Mixed Forest	26.96	Woody Wetlands	2.24
Developed-High Intensity	0	Shrub-Scrub	14.68	Emergent Wetlands	0.28

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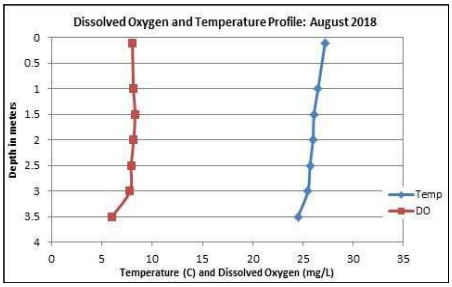
Sunrise Lake, Middleton
2018 Data Summary

Recommended Actions: The above average rainfall in August and resulting stormwater runoff likely transported nutrients (phosphorus) that fueled the elevated algal growth later in the month. This highlights the importance of managing stormwater runoff from lake and watershed properties. DES' "NH Homeowner's Guide to Stormwater Management" is a great resource. Maintaining vegetative buffers along the shoreline also helps to infiltrate stormwater runoff and UNH Cooperative Extension's "Landscaping at the Water's Edge" is another good resource. Consider converting sandy beach areas to perched beaches to minimize erosion of beach sand to the lake. DES fact sheet WD-WB-18 "Perching Beaches to Lessen Impacts to Lake Quality" is a good resource. Conductivity levels continue to increase highlighting the importance of educating local road agents and winter maintenance companies on obtaining a Voluntary Salt Applicator through UNH Technology Transfer Center's Green SnowPro certification program. Consider implementing low salt zones in areas closer to the water. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were elevated in August following a month of above average rainfall. Chlorophyll levels increased from 2017 and were much greater than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), Hypolimnetic (lower water layer), Pinkham Cove, and Tanglewood Bk. conductivity and/or chloride levels were greater than the state medians and indicative of human influences. Epilimnetic conductivity levels have tripled since monitoring began and historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **Color:** Apparent color was measured in the epilimnion and indicates the lake water is lightly tea colored, or light brown.
- **E. coli:** All beaches, Pinkham Cove and Tanglewood Bk. E. coli levels were very low and much less than the state standard of 88 cts/100 mL for public beaches.
- **Total Phosphorus:** Epilimnetic, Hypolimnetic, Pinkham Cove, and Tanglewood Bk. phosphorus levels were within a low range. Epilimnetic phosphorus levels decreased slightly from 2017, were less than the state median, and were approximately equal to the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began.
- **Transparency:** Transparency measured with (VS) and without (NVS) the viewscope was within an average range for the lake, increased (improved) from 2017, and was slightly less than the state median. Historical trend analysis indicates stable transparency levels with high variability between years.
- **Turbidity:** Epilimnetic, Hypolimnetic, Pinkham Cove, and Tanglewood Bk. turbidity levels were within a low range.
- **pH:** Epilimnetic, Hypolimnetic, Pinkham Cove, and Tanglewood Bk. pH levels were within the desirable range 6.5-8.0 units, however epilimnetic pH levels have historically fluctuated below the desirable range. Historical trend analysis indicates relatively stable epilimnetic pH levels since monitoring began.



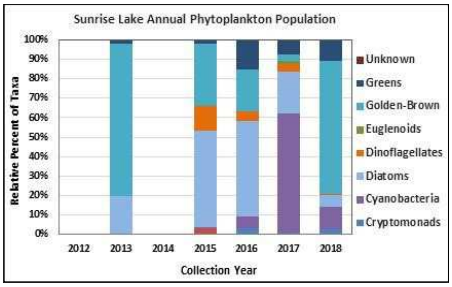


Table 1. 2018 Average Water Quality Data for SUNRISE LAKE - MIDDLETON

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	E. coli mpn/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
								NVS	VS		
Epilimnion	5.3	8.38	27	40	112.6		8	2.62	2.65	0.58	7.08
Hypolimnion					111.6		9			0.68	6.77
Hampshire Shores						9					
Main Beach						2					
Nicola Beach						3					
Nicola Beach 1						2					
Pinkham Cove					112.8	1	7			0.44	6.94
Tanglewood Brook			28		110.7	1	7			0.59	6.88
Town Beach						3					

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.5 mg/L
Chlorophyll-a: 4.39 mg/m^3
Conductivity: 42.3 uS/cm
Chloride: 5 mg/L
Total Phosphorus: 11 ug/L
Transparency: 3.3 m
pH: 6.6

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.